III.   REMARKS

Claims 1-8 and 10-20 are pending in this application. Claims 1, 8, 10, 14, 17, and 20 have been amended, and no claims have been cancelled herein. Applicants do not concede in this application that any claim is not patentable over the art cited by the Examiner, as the present claim amendments are only for facilitating expeditious prosecution of allowable subject matter. Applicants respectfully reserve the right to pursue these and other claims in one or more continuation and/or divisional patent applications. Reconsideration in view of the following remarks is respectfully requested.

Rejections under 35 U.S.C. § 101

In the Office Action, claims 1-7 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Specifically, the Office states that claims 1-7 may be interpreted to be either a process or an apparatus, and therefore are non-statutory because they embrace or overlap two different statutory classes of invention. Applicants have amended claim 1 accordingly, reciting the additional limitations of "at least one processing unit; memory operably associated with the at least one processing unit; and a security system storable in memory and executable by the at least one processing unit, the security system comprising…" Applicants submit that this amendment finds support in the specification at p. 7 *et seq.* ("It is understood that the systems, functions, mechanisms, methods, engines and modules described herein can be implemented in hardware, software, or a combination of hardware and software. They may be implemented by any type of computer system or other apparatus adapted for carrying out the methods described herein…"). Applicants further submit that the amendment to claim 1 also provides improved clarity relative to dependent claims 2-7. Accordingly, Applicants respectfully request withdrawal of the rejection to claims 1-7 under 35 U.S.C. § 101.

Rejections under 35 U.S.C. § 112, 2nd paragraph

In the Office Action, claims 1-7 are rejected under 35 U.S.C. § 112, second paragraph as being indefinite, particularly with regard to structural limitations. Applicants submit that the amendments to claim 1 referenced above, relative to the rejections under § 101, provide the improved clarity necessary to overcome the instant rejection under § 112 as well. Specifically, Applicants submit that the newly added limitation, reciting "at least one processing unit; memory operably associated with the at least one processing unit; and a security system storable in memory and executable by the at least one processing unit, the security system comprising…" recites the necessary structural limitations for the systems listed in the body of claim 1, as well as for dependent claims 2-7. Accordingly, Applicants respectfully request withdrawal of the rejection to claims 1-7 under 35 U.S.C. § 112, 2nd paragraph.

Rejections under 35 U.S.C. § 102(b)

In the Office Action, claims 1-4, 6-8, 10-12, 14, 15, 17, 18, and 20 are rejected under 35 U.S.C. § 102(b) as being anticipated by Rungsarityotin et al. (Wasinee Rungsarityotin et al., *Grid computing and bioinformatics development. A case study on the* Oryza sativa *(rice) genome*, 74 PURE APPL. CHEM. 891-97 (2002) (hereinafter, "Rungsarityotin")), with additional support from the Merriam-Webster online dictionary ("encrypt," "encode," "encipher," and "cipher").

With respect to claim 1, Applicants submit that Rungsarityotin does not disclose, among other features, a security system … comprising "a system for selectively encrypting the sequence of only the coding regions identified in the nucleotide chain; and … outputting the electronic version of the nucleotide chain sequence, including the encrypted coding regions and the unencrypted non-coding regions, wherein the encrypted coding regions require decryption by a secure process to recreate the nucleotide chain sequence." (Claim 1.)

With respect to the "system for selectively encrypting…", the Office asserts that Rungsarityotin anticipates this feature by teaching "using expressed sequence tags (ESTs) treated as genes and marker names (i.e. AP002882 and RZ69) (in Figure 2 and page 894, first paragraph) along the sequence with non-coding regions merely listed as a line (Figure 2)." (Office Action at p. 5.) Applicants respectfully disagree with the Office on this point. Applicants submit that substituting ESTs for portions of the nucleotide chain's actual sequence does not constitute "encrypting" the coding regions of a nucleotide chain such that "encrypted coding regions require decryption by a secure process to recreate the nucleotide chain."

Using the definitions which the Office has supplied (*see* Merriam-Webster Dictionary), "encrypt" means either to "encipher" or "encode." In turn, "encipher" means "to convert (a message) into a cipher." A "cipher" is "a method of transforming a text in order to conceal its meaning." Based on these definitions, to successfully "encrypt" a coding region of a nucleotide chain, that coding region must be "transform[ed] … in order to conceal its meaning."

Applicants submit that the use of expressed sequence tags (ESTs) treated as genes and marker names (e.g, AP002882 and RZ69) along the sequence between lines representing non-coding regions as in Rungsarityotin, does not conceal the meaning of the coding region of the nucleotide chain sequence as would be required to establish encryption. Quite to the contrary, a relationship exists between a given nucleotide chain sequence and its related EST. By definition, ESTs are "relatively short portions (tags) of genomic DNA sequence that are expressed in the form of mRNA" (Harvey Lodish, et al., MOLECULAR CELL BIOLOGY, 4TH ED., 227 (2000)). As it is widely known, mRNA is complementary to, but not identical to, the mRNA's respective DNA sequence. Because of the complementary relationship between DNA and mRNA, the nucleotide chain sequence could be used to predict the mRNA sequence, which in turn, could be used to

predict the EST's identity. The same flow of information would also work in reverse. Therefore, the use of ESTs substituted for the actual nucleotide chain's sequence cannot be accurately characterized as "concealing" or encrypting the meaning of the coding region of the nucleotide chain such that it would be necessary to "decrypt[] by a secure process" to later use the data.

According to the Merriam-Webster Online Dictionary cited by the Office, if "encode," rather than "encipher" were taken as the definition of "encrypt," successful encryption would require one "to convert (as a body of information) from one system of communication into another; *especially* : to convert (a message) into code," (emphasis and formatting original) or "to convey symbolically," or "to specify the genetic code for." Applicants submit that each of these definitions is equally inapposite to the feature of the claimed invention that is at issue. As noted above, the use of ESTs substituted for a recitation of the actual nucleotide chain sequence fails to change the meaning of the data, and arguably does not convert the nucleotide chain sequence into a "code" as would be required. Further, such expression fails to "specify the genetic code for" the original nucleotide chain sequence, because substituting ESTs for a recitation of the original nucleotide chain sequence actually represents the *opposite* of "specifying the genetic code for" the sequence, which would entail specifying the order of the nucleotide bases, including adenenine, thymine, guanine, and cytosine.

Accordingly, it is not possible for Rungsarityotin's use of ESTs to accomplish "encryption" as claimed in the invention herein, regardless of which definition of "encrypt" is used.

With respect to the "system for outputting the electronic version of the nucleotide chain sequence... wherein the encrypted coding regions require decryption," the Office asserts that this

feature is anticipated by Rungsarityotin's disclosure of visualizing DNA data, and communication between several sources of data and XML-based DNA transported for further representation (abstract; Figures 1, 2, 4) including textual or graphical output (Figure 2 caption). (Office Action at p. 5.) Applicants also respectfully disagree with the Office on this point. As discussed above, Applicants submit that Rungsarityotin fails to teach "encrypted coding regions," particularly because Rungsarityotin clearly fails to disclose encryption such that "decryption by a secure process" would be necessary to regenerate the nucleotide chain. Moreover, by representing the non-coding regions as a line, Rungsarityotin fails to disclose outputting the sequence of non-coding regions of the nucleotide chain at all, regardless of encryption status. Therefore, Rugsarityotin would not anticipate the "system for outputting ... including the encrypted coding regions and unencrypted non-coding regions" taught by the claimed invention.

Additionally, Applicants submit that, contrary to the Office's assertions, Rungsarityotin does not teach a security system including, *inter alia*, the feature of "a system for outputting the *electronic version of the nucleotide chain sequence*." (Claim 1 (emphasis added).) In the Office Action, the Office posits that the resulting map in Rungsarityotin (at Fig. 2) represents an electronic version of the nucleotide chain because the claim does not specify how long that nucleotide chain must be, or if it must include the entire nucleotide sequence (*see* Office Action, p. 8).

Applicants have amended claim 1 herein, and submit that claim 1 implicitly specifies how long the electronic version of the sequence of the nucleotide chain must be, by virtue of the principles of antecedent basis. At line 1-2, claim 1 recites "an electronic version of a sequence of a nucleotide chain." Subsequently, the claim (as amended) recites a system for "identifying

all coding and non-coding regions in the nucleotide chain; selectively encrypting only the coding regions identified in the nucleotide chain"; and outputting the electronic version of the sequence of the nucleotide chain" (emphasis added). Accordingly, the claim implicitly states that the sequence of the nucleotide chain which is the subject of the outputting is necessarily the same, original (e.g., complete) nucleotide chain sequence from which the coding and non coding regions were identified. Therefore, the "electronic version of the sequence of the nucleotide chain" referenced at lines 1-2 and 11-12 refer to the same chain, and must include both coding and non-coding sections. If the chain did not include both, the act of "identifying all coding and non-coding regions" would not be possible. This interpretation is supported in the specification at p. 7 ("Once decrypted, chain reassembly system 48 reassembles the regions back to the original nucleotide chain 12").

Additionally, Applicants submit that the amendment reciting "a system for identifying all coding and non-coding regions" (claim 1, line 7) provides further support. This amendment speaks to the statement in the Office Action that the claim does not specify how long the nucleotide chain must be, or if it must include the entire nucleotide sequence (Office Action at p. 8). By virtue for the amendment reciting "all coding and non-coding regions," the claim implicitly requires that the recreated nucleotide chain sequence be complete, including the entire nucleotide sequence.

Because Rungsarityotin teaches the representation of non-coded regions by a line in the resulting physical map of BAC sequence from chromosome 1 of the rice genome, Applicants respectfully submit that Rungsarityotin fails to teach the feature of "outputting the electronic version of the nucleotide chain sequence, including the encrypted coding regions and the unencrypted non-coding regions" (emphasis added).

With respect to the rejections of independent claims 8, 14, and 17, Applicants note that each claim includes features similar in scope to those already addressed above with respect to claim 1, and have been amended analogously. Further, the Office relies on the same arguments and interpretations of Rungsarityotin and the Merriam-Webster Online Dictionary as discussed above with respect to claim 1. To this extent, Applicants herein incorporate the arguments presented above with respect to claim 1, and respectfully request withdrawal of the rejections of claims 8, 14, and 17 for the above-stated reasons. Accordingly, Applicants respectfully request that the rejections to independent claims 1, 8, 14, and 17 be withdrawn.

With respect to claims 2-4, 6, 7, 10-12, 15, 18, and 20, Applicants respectfully submit that these claims are allowable for reasons stated above relative to independent claims 1, 8, 14, and 17, as well as for their own additional claimed subject matter. Accordingly, Applicants respectfully request that the Office withdraw the rejections under 35 U.S.C. § 102(b) to claims 2-4, 6, 7, 10-12, 15, 18, and 20.

Rejections under 35 U.S.C. § 103(a)

In the Office Action, claims 1-8 and 10-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rungsarityotin with additional support from the Merriam-Webster online dictionary, in view of Jorgenson *et al.* (US Pub. No. 2004/0221163 A1). With respect to these rejections, Applicants assert that the combined references cited by the Office fail to teach or suggest each and every feature of the claimed invention. For example, with respect to independent claim 1, Applicants respectfully submit that the combined references fail to teach or suggest "a security system ... comprising "a system for selectively encrypting the sequence of only the coding regions identified in the nucleotide chain sequence; and ... outputting the electronic version of the nucleotide chain, including the encrypted coding regions and the

unencrypted non-coding regions, wherein the encrypted coding regions require decryption..."
Claims 8, 14, and 17 include similar subject matter not taught or suggested.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. Applicants respectfully submit that the Rungsarityotin (with additional support from Merriam-Webster) and Jorgenson references, taken alone or in combination, fail to meet each of the three basic criteria required to establish a *prima facie* case of obviousness. As such, the rejection under 35 U.S.C. § 103(a) is defective.

With respect to the rejections of independent claims 1, 8, 14, and 17, Applicants note that the Office relies on the same arguments and interpretations of Rungsarityotin (supported by Merriam-Webster Online Dictionary) as discussed above with respect to the rejections under § 102(b). To this extent, Applicants herein incorporate the arguments presented above with respect to the deficiencies in Rungsarityotin discussed previously. Applicants assert that because the Office relies on Jorgenson strictly for its disclosure of securing transmitting data using an encryption scheme including cipher block chaining, the Jorgenson reference does not overcome the deficiencies in Rungsarityotin. Accordingly, Applicants respectfully request that the rejections to claims 1, 8, 14, and 17 under § 103(a) be withdrawn.
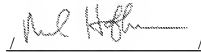
With respect to claims 2-4, 6, 7, 10-12, 15, 18, and 20, Applicants respectfully submit that these claims are allowable for reasons stated above relative to independent claims 1, 8, 14, and 17, as well as for their own additional claimed subject matter. Accordingly, Applicants

respectfully request that the Office withdraw the rejections under 35 U.S.C. § 103(a) to claims 2-4, 6, 7, 10-12, 15, 18, and 20.

IV.   CONCLUSION

Applicants respectfully submit that the Application as presented is in condition for allowance. Should the Examiner believe that anything further is necessary in order to place the application in better condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

/   /
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